

Title: A Modeling Study of the Spring 2011 Extreme US Weather Activity

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Submitted to AGU

Abstract

The spring of 2011 was characterized by record-breaking tornadic activity with substantial loss of life and destruction of property. While a waning La Nina and other atmospheric teleconnections have been implicated in the development of these extreme weather events, a quantitative assessment of their causes is still lacking. This study uses high resolution ($1/4^\circ$ lat/lon) GEOS-5 AGCM experiments to quantify the role of SSTs and soil moisture in the development of the extreme weather activity with a focus on April – the month of peak tornadic activity. The simulations, consisting of 22-member ensembles of three-month long simulations (initialized March 1st) reproduce the main features of the observed large-scale changes including the below-normal temperature and above-normal precipitation in the Central US, and the hot and dry conditions to the south. Various sensitivity experiments are conducted to separate the roles of the SST, soil moisture and the initial atmospheric conditions in the development and predictability of the atmospheric conditions (wind shear, moisture, etc.) favoring the severe weather activity and flooding.